REMARKS

Reconsideration and further examination is respectfully requested.

In response to the restriction requirement and Examiner telephone conversation of December 29, 2004, Applicant hereby elects Group I, species (i) for prosecution at this time. Accordingly, claims 3-4 and 11-24 are withdrawn by this amendment.

Objections to the Claims

Claim 1 was objected to for the omission of a modifier. Applicant has overcome this rejection through the insertion of the word 'to' in claim 1. Applicant has also corrected the numbering of claim 24. Accordingly, it is submitted that the objection is overcome and should be withdrawn.

Rejections under 35 U.S.C. §103

Claims 1-2, 6-10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kakui et al. (kakui) (US 2003/0210844).

Kakui

Kakui describes, in the abstract "...an optical amplifier and the like having a flatter gain spectrum in the wavelength band of 1490 nm to 1520 nm than before. The optical amplifier according to the present invention comprises an Er-doped optical waveguide and a Tm-doped optical waveguide having gain spectra difference from each other in the wavelength band..."

When discussing how Kakui determined the design of the optical amplifier of their invention, Kakui states, at paragraphs 10 – 11:

> "...Suggestions were thus made on the EDFA capable of amplifying the signal light near the wavelength region of 1490 nm to 1520 nm ... The EDFA disclosed in these is arranged to enhance the population inversion and thereby amplify the signal light in the

> above-mentioned wavelength region....This EDFA. however, has a very large positive gain inclination in the above-mentioned wavelength region ***and it is thus impossible to realize gain flattening singly. Therefore, it must be used in combination with a Raman amplifier to achieve gain flattening.*** Nevertheless, the Raman amplifier has problems of lower pumping efficiency, larger scale because of necessity for the fiber length of even several km, deterioration of transmission quality of signal light due to the nonlinear optical phenomena and double Rayleigh scattering in the optical fiber, and so on, as compared with the EDFA and TDFA..."
>
> Kakui repeats its characterization of the difficulty of using EDFA amplifiers alone at paragraph 64.

The invention of Kakui, rather than use a single EDFA, provides an invention having an EDFA TDFA combination, and:

> "...comprises a Tm-doped optical waveguide having an optical waveguide region doped with Tm, and an Er-doped optical waveguide optically connected to the Tm-doped optical waveguide and having an optical waveguide region doped with Er. An optical amplifier amplifies signal light entered through an input end thereof and outputting the amplified signal light from an output end thereof, and comprises the optical amplification module according to the present invention, including the Tm-doped optical waveguide and the Er-doped optical waveguide; first pumping light supply system for supplying pumping light of a wavelength capable of pumping Er ions, into the Er-doped optical waveguide; and second pumping light supply system for supplying pumping light of a wavelength capable of pumping Tm ions, into the Tm-doped optical waveguide..."

In contrast, the present invention takes a different approach which is contrary to the teachings of Kakui. While Kakui teaches that 'it is impossible to realize gain flattening singly,' the present invention, (as described on pages 3 and 6-8 of Applicants' specification) *does so* by intelligently pre-selecting communication wavelengths based on the gain characteristic of the amplifier at the particular wavelength. For example, claim 1 recites "*...wherein the wavelengths of N channels forwarded by the optical repeater are selected responsive to a gain behavior of the amplifier at the wavelengths of the N channels...*" Such a solution enables reliable

transmission of optical signals without the use of expensive gain flattening filters, or other complex combinations of doped silicon, as suggested in Kakui.

The Examiner states, at page 6 of the Office Action:

"... However, Kakui deos not specifically teach where in the above responsive to at least one of the N channels is 'tuned' to at least one the N-channels and that the channels are spaced at 50 GHZ intervals. Nevertheless, Kakui teaching includes wherein the amplifier 22 selectively responsive to N-channels input to the amplifier as shown in figure 1 and that Kakui's teaching further includes wherein frequencies of the N-channels are spaced at 100 GHz intervals (see paragraph 0084). Thus, it is obvious/well known to those of ordinary skill in the art when the invention was made to modify Kakui's number of N-channel in given band-frequencies (i.e., c-band) as to be spaced at 50 Ghz, since such channeling is conventional and that the specification by the applicant suggest that channel spacing may also be used at 50 Ghz, since such modification would provide gain flattening amplification with very large positive gain inclination (see col. 1, paragraph 10-11)...."

Claims 1,2, 5-10:

Examiner has failed to establish prima facie case of obviousness

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The Examiner has failed to meet these qualifications.

No motivation for modification suggested by the Examiner

As best can be understood by the Applicant, one would be motivated to modify Kakui to meet the claimed invention because "... it is obvious to modify Kakui's number of N-channel in given band frequencies ... to be spaced at 50 Ghz, since such channeling is conventional..." The Examiner relies on Applicants' application for this teaching.

However, Applicants disclosure of the prior art states, on pages 1 and 5 of the specification with discussion of the prior art, that the C-band is generally spaced at 200Ghz intervals, due to interference caused by the gain characteristics of the devices in the communication path. It is only with the use of the present invention where the Applicant describes the use of 50Ghz spacing. Given that Applicants only teaching is that conventional practice is to use 200 Ghz spacing, Applicant traverses the Examiner's characterization that Applicants specification teaches that 50 Ghz spacing ubiquitous. In support of Applicants position, Applicant notes that Kakui describes, at paragraph 59 "... the signal light entered through the input end 101 is forty channels with the frequency interval of 100Ghz included in the wavelength band..."

However, assuming that 50 Ghz spacing is done with various complex circuitry, the Examiner has still failed to describe why Kakui would be motivated to be modified to select wavelengths 'responsive to a gain characteristic of an amplifier...", as recited in the claims. It does not appear that the Examiner has provided any reason why Kakui would be motivated to be modified in this manner. Accordingly, for at least the reason that the Examiner has failed to put forth proper motivations for the suggested modifications, the rejection is improper and should be withdrawn.

Combination neither describes nor suggests the claimed invention

Applicant's claim 1 recites "...An N-channel optical repeater comprising ... an amplifier for amplifying an input signal tuned to at least one of the N channels, wherein the wavelengths of N channels forwarded by the optical repeater are selected responsive to a gain behavior of the amplifier at the wavelengths of the N channels...." No such repeater is disclosed in Kakui. Rather, it appears that the arrangement disclosed by Kakui envisions full use of channels evenly distributed across a frequency band. (For example, Kakui states at paragraph 68 "forty channels with the frequency interval of 100 Ghz included in the wavelength band of 1489.3 nm to 1518.7 nm). Accordingly, for at least the reason that Kakui fails to teach an amplifier 'wherein the wavelengths of the N channels forwarded by the optical repeater are selected responsive to a gain behavior of the amplifier..." the rejection of the claim under 35 U.S.C. §103 is improper and should be withdrawn.

Dependent claims 2, 5-10:

Dependent claims 2 and 5-10 serve to add further patentable limitations to claim 1 and are thus allowable with claim 1.

Applicant has made a diligent effort to place the claims in condition for allowance. However, should there remain unresolved issues that require adverse action, it is respectfully requested that the Examiner telephone the undersigned, Applicants' Attorney at 978-264-6664 so that such issues may be resolved as expeditiously as possible.

For these reasons, and in view of the above amendments, this application is now considered to be in condition for allowance and such action is earnestly solicited.

Respectfully Submitted,

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Date

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